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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/241,636	02/02/99	HEATH	E 5253

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EXAMINER	
ENEWOLD, J	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/241,636	Applicant(s) Ellen M. Heath And Ruth M. Shuman
	Examiner Jeanine Enewold	Group Art Unit 1655

☐ Responsive to communication(s) filed on _____ .

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *three* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *1-53* is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-53* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐approved ☐disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____ .

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____ .

☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

Priority

1. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119 as follows:

It is requested that the Provisional Application numbers be included on the PTO-SB-01. It is unclear as to which applications are being claimed for priority.

Specification

2. The abstract of the disclosure is objected to because the abstract does not describe the steps of the invention but only the objective. The abstract should be amended to describe the inventive steps of the method. Correction is required. See MPEP § 608.01(b).

3. The specification is objected to because the specification lacks a generic description of the trademarks. Examples include: DNA purifying reagent (GENERATION DNA Purification Solution, Gentra Systems, Inc.)(pg 52), The Capture Column (pg 52) and DNA Elution Solution (pg 52).

Claim Objections

4. The claims are objected to for the following:

A) Claims 3-7, 15-17,28-33, and 44-48 are objected to under 37 CFR 1.75 (c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP §608.01(n).

B) Claims 28 and 33-41 are in improper Markush form. (See MPEP 2273.05(h)). A Markush group should read as "...is selected from the group consisting of..."

C) Claims 5, 8-10, 29 are objected to over the recitation of "bacterial cells" and "bacteria" in the Markush group because they are the same elements recited twice. Similarly the claims are objected to over "lysates and homogenates" because these elements are also equivalent. Deletion of one of the equivalent terms would overcome the rejection.

D) Claims 7 and 31 are objected to as being in an improper Markush form because the group as written only includes environmental samples. The objection can be overcome by amending the claim to instead read "the biological material is an environmental sample take from air, water, sediment or soil."

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-53 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A) Claims 1-25, 45-53 are indefinite because the claims do not recite a positive process step which clearly relates back to the preamble. The preamble states that the method is for "characterizing" DNA but the final process step is purifying DNA. Therefore the claims are unclear as to whether the method is a method of characterizing DNA or purifying DNA.

B) Claims 1-25 and 45-53 are also indefinite over the recitation in line 1 of claim 1 and 2 of "the step" because this term lacks antecedent basis. This rejection can be overcome by amending to "a step".

C) In Claims 4 and 44 are indefinite as it is unclear when the solid support is heated to greater than 60 degrees. That is, as written it is unclear whether the heating occurs after step (a) for the purpose of lysis or after step (c) to achieve release of the DNA from the solid support. Additionally, Claims 4 and 44 are indefinite over the recitation of "the further step of heating" because "the further step of heating" lacks antecedent basis. Specifically, the claims from which Claims 4 and 44 (claims 1&2 and 26& 27, respectively) depend do not recite "a further step of heating".

D) In Claims 8-10 are indefinite as it is unclear when the counting of the cells should occur in the method and what purpose the counting entails. That is, as written it is unclear whether the counting step occurs before the biological material has been contacted to the solid

support or following the contacting with a solid support. Additionally, Claims 8-10 are indefinite over the recitation of "the step of counting" because "the step of counting" lacks antecedent basis. Specifically the claims from which Claims 8-10 depend do not recite "a step of counting". Furthermore, the claims would be clear if the following recitation was inserted after "cells": "when the biological material is eukaryotic cells (claim 8); prokaryotic cells (claim 9); and viruses (claim 10).

E) Claims 11 and 13 are indefinite over the recitation of "the step of characterizing the remainder of the lysate" because "the remainder", "the step of characterizing" and "the lysate" lacks antecedent basis. Specifically, the claims from which Claim 11 depends do not recite "a remainder", "a step of characterizing" or a "lysate".

F) Claims 12 and 14 are indefinite over the recitation of "the step of characterizing the remainder of the biological material" because "the step of characterizing" and "the remainder of the biological material" lacks antecedent basis. Specifically, the claims from which Claim 12 depends do not recite "a step of characterizing" or "a remainder of the biological material".

G) Claims 13 and 14 are further indefinite over the recitation of "the step of monitoring impurities" because "the step of monitoring impurities" lacks antecedent basis. Specifically, the claims from which Claim 13 and 14 depend do not recite "a step of monitoring impurities".

H) Claims 15 and 47 are indefinite over the recitation of "the step of quantitating" because "the step of quantitating" lacks antecedent basis. Specifically, the claims from which Claims 15 and 47 depend do not recite "a step of quantitating".

I) Claim 16 is indefinite over the recitation of "the step of adjusting the concentration of DNA" because "the step of adjusting the concentration of DNA" lacks antecedent basis. Specifically, the claims from which Claim 16 depends do not recite "a step of adjusting the concentration of DNA".

J) Claims 17-23 and 48-53 are indefinite over the recitation of "the step of evaluating" because "the step of evaluating" lacks antecedent basis. Specifically, the claims from which Claims 17 and 48 depend do not recite "a step of evaluating".

K) Claim 18 is further indefinite over the recitation of "the step of determining the yield" because "the step of determining the yield" lacks antecedent basis. Specifically, Claim 17 from which Claim 18 depends, does not recite "a step of determining the yield".

L) Claims 19 and 49 are indefinite over the recitation of "the step of determining the size" because "the step of determining the size" lacks antecedent basis. Specifically, the claims from which Claims 19 and 49 depend do not recite "a step of determining the size".

M) Claim 20 is indefinite over the recitation of "the step of determining the purity" because "the step of determining the purity" lacks antecedent basis. Specifically, the claims from which Claim 20 depends do not recite "a step of determining the purity".

N) Claims 21 and 50 are indefinite over the recitation of "the step of digesting" because "the step of digesting" lacks antecedent basis. Specifically, the claims from which Claims 21 and 50 depend do not recite "a step of digesting".

O) Claims 22 and 52 are indefinite over the recitation of "the step of analyzing" because "the step of analyzing" lacks antecedent basis. Specifically, the claims from which Claims 22 and 52 depend do not recite "a step of analyzing".

P) Claims 23 and 53 are indefinite over the recitation of "the step of conducting a hybridization analysis" because "the step of conducting a hybridization analysis" lacks antecedent basis. Specifically, the claims from which Claims 23 and 53 depend do not recite "a step of conducting a hybridization analysis".

Q) Claims 26, 28-41, 44, and 46-53 are indefinite over the recitation of step (a) "contacting....with a solid support treated with a lysing matrix" because this phrase makes the claims unclear as to whether the lysing matrix is a liquid solution which is contacted with a solid support or whether the lysing matrix is the solid support. The specification does not describe contacting a lysis matrix to a solid support but instead describes the lysis matrix as a type of solid support (pg 49, example 24) and teaches contacting lysis reagents (i.e. a solution) to a solid support.

R) Claims 26, 28-41, 44, 46-53 are further indefinite over the recitation of "the lysing reagent" because this term lacks antecedent basis. The claim only recites a "lysing matrix".

S) Claims 42-43 are indefinite over the recitation of "the combined amount...about 20mM" because 20mM designates a concentration rather than an amount. Consequently claims are unclear as to whether the claim is intended to recite "an amount" i.e. a volume or a concentration. The rejection could be overcome by amending "amount" to concentration.

T) Claims 24-25 and 45 are indefinite over the recitation of "the step of amplifying" because "the step of amplifying" lacks antecedent basis. Specifically, the claims from which Claims 24-25 and 45 depend, respectively, do not recite "a step of amplifying".

U) Claims 37-41 are indefinite over the recitation of "the lysing reagent" because "the lysing reagent" lacks antecedent basis. Specifically, the claims from which Claims 37-41 depend do not recite "a lysing reagent". Claim 26 only recites a "lysing matrix" and Claim 27 recites no lysing element.

V) Claim 51 is indefinite over the recitation of "the step of sequencing" because "the step of sequencing" lacks antecedent basis. Specifically, the claims from which Claim 51 depends do not recite "a step of sequencing".

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-3, 5-6, 8, 11-21, 23-30, 32-33, 37, 39, 41, 45-51, and 53 are rejected under 35 U.S.C. 102(b) as being anticipated by Boom et al (5,234,809).

Boom teaches methods of characterizing DNA. Boom discloses a process which involved contacting the biological material that contains DNA with a solid support that had been treated with a lysing reagent (i.e. a chaotropic substance), treating the biological material with a purifying reagent, and purifying the DNA (col. 4, lines 3-59). The chaotropic substance (lysing reagent) is contacted with silica particles (solid support). The biological material is then treated with purifying reagents, and the remainder of the biological matter is purified (washing buffer, alcohol washing solution and acetone.) Additionally, the process described by Boom produces DNA which can be further used to "demonstrate NA sequences by means of an amplification method such as the PCR method...." (col.4, lines 48-50)(limitations of claims 24-27 and 45-46). Since Boom teaches that the Gus SCN (i.e. the lysis reagent) is added to the solid support (i.e. the silica beads) prior to addition of biological material, Boom is inherently teaching a solid support to which a lysing reagent is "bound." The term "bound" is being broadly interpreted to mean loosely and transiently in contact with the solid support. As described in Boom, the DNA may be eluted from the solid support by means of an eluting reagent (col.4, line 33). Boom teaches an eluting reagent can be TE buffer, aqua bidest or PCR buffer. Boom further teaches the process where in the solid support is contained in a single vessel (col.4, lines 34-36) (limitations of claims 3 and 28). Boom demonstrates the use of isolating nucleic acids from a nucleic acid-containing biological material (col. 1, lines 10-20). The biological material stated includes tissues, cell cultures, blood, urine, and saliva (body fluids)(limitations of claims 5-6, 29-30). The nucleic acid was taught to be examined by gel electrophoresis (col. 10, lines 13-24) (limitations of claims 12-

17, 19, 21, 47-49). This method may be used for characterizing the biological material and monitoring impurities. Yields were also taught in example A1 (col. 12, lines 46-48)(limitations of claim 18). Eluted DNA was treated with a restriction enzyme, electrophoresed and visualized (col 12 65-68) (limitations of claims 21 and 50). Boom also teaches hybridization analysis of the isolated nucleic acids (col. 9, lines 19-21)(limitations of claims 23 and 53). Boom teaches a method which can "provide a process with which nucleic acid can be isolated immediately (without pretreatments) ..." (col. 1, lines 64-67) (limitation of claim 32). Boom teaches lysis buffers containing Tris (buffer), aqua bidest, GuSCN, and EDTA (col 6, lines 39-68). Therefore, since Boom has taught a method having every limitation recited in the claimed methods Boom reads on the claimed method.

9. Claims 1-20, 24-33, 37-41, and 44-49 are rejected under 35 U.S.C. 102(b) as being anticipated by Deggerdal (WO 96/18731).

Deggerdal teaches methods of characterizing DNA. Deggerdal discloses a "method of isolating nucleic acid from a sample, said method comprising contacting said sample with a detergent and a solid support, whereby soluble nucleic acid in said sample is bound to the support, and separating said support with bound nucleic acid from the sample" (pg 5, para 2). Deggerdal teaches that the "nucleic acid-containing sample may....be contacted with the detergent and solid phase which may be added to the sample prior to, simultaneously with, or subsequently to the detergent (which functions in the method to lyse)"(pg 7, para 3, lines 22-29). Deggerdal is

inherently teaching a solid support to which a lysing reagent is "bound." The term "bound" is being broadly interpreted to mean loosely and transiently in contact with the solid support. The solid support was contained in a vessel (pg 26, line 18). Deggerdal teaches isolation of nucleic acids and the elution of the nucleic acid by heating to 65 C for 5-10 minutes (pg 12, para 3, line 3)(limitations of claims 4 and 44). The samples may be of "any material containing nucleic acid" (pg 6, para 1, line 1-3)(limitations of claims 5-7 and 29-31). Deggerdal teaches a method of DNA isolation from cultured cells which indicates the number of cells used as starting material (pg 33, line 1) (limitations of claims 8-10). The purified DNA was then analyzed by PCR and visualized on agarose gel electrophoresis (pg 20, lines 29-32). Detection of extra bands indicated contamination (pg 17, lines 26-27). The solid support was taught to be made of "glass, silica, latex or a polymeric material" (pg 9, para 3)(limitations of claim 33). Deggerdal teaches an example where cells were lysed using DNA DIRECT Dynabeads and the lysate from each sample was further characterized (pg 35, lines 6-35)(limitations of claim 11). Deggerdal teaches the lysing reagent as a detergent. This detergent may be supplied in simple aqueous solution (pg 8, line 7). Further any suitable buffer (Tris) is taught. The reagent may also include components such as enzymes, chelating agents and reducing agents (pg 8, lines 7-23) (limitations of claims 37-41). Therefore, since Deggerdal has taught a method having every limitation recited in the claimed methods, Deggerdal reads on the claimed method.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103 (c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 38 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boom (5,234,809) in view of Deggerdal (WO 96/18731).

Boom teaches methods of characterizing DNA. Boom discloses a process which involved contacting the biological material that contains DNA with a solid support that had been treated with a lysing reagent (i.e. a chaotropic substance), treating the biological material with a purifying reagent, and purifying the DNA (col. 4, lines 3-59). The chaotropic substance (lysing reagent) is

contacted with silica particles (solid support). The biological material is then treated with purifying reagents, and the remainder of the biological matter is purified (washing buffer, alcohol washing solution and acetone.) Additionally, the process described by Boom produces DNA which can be further used to "demonstrate NA sequences by means of an amplification method such as the PCR method...." (col.4, lines 48-50). Since Boom teaches that the Gus SCN (i.e. the lysis reagent) is added to the solid support (i.e. the silica beads) prior to addition of biological material, Boom is inherently teaching a solid support to which a lysing reagent is "bound." The term "bound" is being broadly interpreted to mean loosely and transiently in contact with the solid support.

Boom does not teach a lysing reagent which does not contain a buffer.

Deggerdal, however, teaches a lysing reagent as a detergent. This detergent may be supplied in simple aqueous solution (pg 8, line 7). Further any suitable buffer (Tris) is taught. The reagent may also include components such as enzymes, chelating agents and reducing agents (pg 8, lines 7-23) (limitations of claims 37-41).

Therefore, it would have been prima facie obvious to one of ordinary skill at the time of the invention was made to have modified the method of Boom to include the use of the lysing reagents taught in Deggerdal. The ordinary artisan would have been motivated to use the lysing reagents taught in Deggerdal because the lysing reagents taught in Deggerdal were readily available.

13. Claims 23 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deggerdal (WO 96/18731) in view of Boom (5,234,809).

Deggerdal teaches methods of characterizing DNA. Deggerdal discloses a "method of isolating nucleic acid from a sample, said method comprising contacting said sample with a detergent and a solid support, whereby soluble nucleic acid in said sample is bound to the support, and separating said support with bound nucleic acid from the sample" (pg 5, para 2). Deggerdal teaches that the "nucleic acid-containing sample may....be contacted with the detergent and solid phase which may be added to the sample prior to, simultaneously with, or subsequently to the detergent (which functions in the method to lyse)"(pg 7, para 3, lines 22-29). Deggerdal is inherently teaching a solid support to which a lysing reagent is "bound." The term "bound" is being broadly interpreted to mean loosely and transiently in contact with the solid support. The solid support was contained in a vessel (pg 26, line 18). Deggerdal teaches isolation of nucleic acids and the elution of the nucleic acid by heating to 65 C for 5-10 minutes (pg 12, para 3, line 3)(limitations of claims 4 and 44). The samples may be of "any material containing nucleic acid" (pg 6, para 1, line 1-3)(limitations of claims 5-7). Deggerdal teaches a method of DNA isolation from cultured cells which indicates the number of cells used as starting material (pg 33, line 1) (limitations of claims 8-9). The purified DNA was then analyzed by PCR and visualized on agarose gel electrophoresis (pg 20, lines 29-32).

Deggerdal does not teach conducting a hybridization analysis on the amplified DNA.

Boom teaches hybridization analysis of the isolated nucleic acids (col. 9, lines 19-21).

Therefore, it would have been prima facie obvious to one of ordinary skill at the time of the invention was made to have applied the method of Deggerdal to include the method of hybridization reactions as used in the method of Boom. The ordinary artisan would have been motivated to have conducted hybridization reactions taught in the method of Boom on the isolated DNA obtained from the Deggerdal method to further characterize the DNA sample.

14. Claims 7, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boom (5,234,809) in view of Su (5,804,684).

Boom teaches methods of characterizing DNA. Boom discloses a process which involved contacting the biological material that contains DNA with a solid support that had been treated with a lysing reagent (i.e. a chaotropic substance), treating the biological material with a purifying reagent, and purifying the DNA (col. 4, lines 3-59). The chaotropic substance (lysing reagent) is contacted with silica particles (solid support). The biological material is then treated with purifying reagents, and the remainder of the biological matter is purified (washing buffer, alcohol washing solution and acetone.) Additionally, the process described by Boom produces DNA which can be further used to "demonstrate NA sequences by means of an amplification method such as the PCR method...." (col.4, lines 48-50). Since Boom teaches that the Gus SCN (i.e. the lysis reagent) is added to the solid support (i.e. the silica beads) prior to addition of biological material, Boom is inherently teaching a solid support to which a lysing reagent is "bound." The

term "bound" is being broadly interpreted to mean loosely and transiently in contact with the solid support.

Boom does not specifically teach biological material from the group consisting of environmental samples taken from air, water, sediment and soil. Although Boom teaches that a variety of solid support can be used (col. 2, lines 52-63), he does not specifically teach the solid support recited in the claims.

However, Su teaches a list of samples which includes "any type of biological sample....environmental, nutritional, scientific or industrial significance" (col.8, lines 3-16). Su teaches the use of cellulose, rayon, cellulose acetate, silica and more as suitable solid supports for DNA isolation (col.3, lines 35-49; col 15, line 18).

Therefore, it would have been prima facie obvious to one of ordinary skill at the time of the invention was made to have applied the method of Boom to include the use of environmental samples as the biological starting material as used in the method of Su. The ordinary artisan would have been motivated to have sampled the biological materials from the environment because environmental samples are a well known source of clinically important DNA containing organisms whose detection is necessary to prevent disease spread, for example.

Therefore, it would have been prima facie obvious to one of ordinary skill at the time of the invention was made to have applied the method of Boom to include the use of other solid supports as used in the method of Su. Also, the ordinary artisan would have suspected that using the methods described in Boom with solid supports other than silica beads would provide similar

results because Su teaches the use of polysaccharides, protein/polypeptides, synthetic fibers, synthetic plastics and silica are all suitable solid supports.

15. Claims 42-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boom (5, 804,684) or Deggerdal (WO 96/18731) in view of Su (5,804684).

Boom teaches methods of characterizing DNA. Boom discloses a process which involved contacting the biological material that contains DNA with a solid support that had been treated with a lysing reagent (i.e. a chaotropic substance), treating the biological material with a purifying reagent, and purifying the DNA (col. 4, lines 3-59). The chaotropic substance (lysing reagent) is contacted with silica particles (solid support). The biological material is then treated with purifying reagents, and the remainder of the biological matter is purified (washing buffer, alcohol washing solution and acetone.) Additionally, the process described by Boom produces DNA which can be further used to "demonstrate NA sequences by means of an amplification method such as the PCR method...." (col.4, lines 48-50). Since Boom teaches that the Gus SCN (i.e. the lysis reagent) is added to the solid support (i.e. the silica beads) prior to addition of biological material, Boom is inherently teaching a solid support to which a lysing reagent is "bound." The term "bound" is being broadly interpreted to mean loosely and transiently in contact with the solid support.

Deggerdal teaches methods of characterizing DNA. Deggerdal discloses a "method of isolating nucleic acid from a sample, said method comprising contacting said sample with a

detergent and a solid support, whereby soluble nucleic acid in said sample is bound to the support, and separating said support with bound nucleic acid from the sample" (pg 5, para 2). Deggerdal teaches that the "nucleic acid-containing sample may....be contacted with the detergent and solid phase which may be added to the sample prior to, simultaneously with, or subsequently to the detergent (which functions in the method to lyse)"(pg 7, para 3, lines 22-29). Deggerdal is inherently teaching a solid support to which a lysing reagent is "bound." The term "bound" is being broadly interpreted to mean loosely and transiently in contact with the solid support. The solid support was contained in a vessel (pg 26, line 18). Deggerdal teaches isolation of nucleic acids and the elution of the nucleic acid by heating to 65 C for 5-10 minutes (pg 12, para 3, line 3)(limitations of claims 4 and 44). The samples may be of "any material containing nucleic acid" (pg 6, para 1, line 1-3)(limitations of claims 5-7). Deggerdal teaches a method of DNA isolation from cultured cells which indicates the number of cells used as starting material (pg 33, line 1) (limitations of claims 8-9). The purified DNA was then analyzed by PCR and visualized on agarose gel electrophoresis (pg 20, lines 29-32).

Boom nor Deggerdal not teach the eluting reagent as specified in the claims..

Su teaches the elution buffer to be 5 mM Tris HCl, pH 9, and 0.5 mM EDTA (col 10, line 17).

Therefore, it would have been prima facie obvious to one of ordinary skill at the time of the invention was made to have modified the method of Boom or Deggerdal to include the use of the elution buffer described in the method of Su. The ordinary artisan would also have expected

that using the elution buffer of Su in the method of Boom or Deggerdal with the elution buffer described in Su would have provided equivalent results.

16. Claims 22 and 51-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boom (5,804,684) or Deggerdal (WO 96/18731) in view of Sambrook (Molecular Cloning).

Boom teaches methods of characterizing DNA. Boom discloses a process which involved contacting the biological material that contains DNA with a solid support that had been treated with a lysing reagent (i.e. a chaotropic substance), treating the biological material with a purifying reagent, and purifying the DNA (col. 4, lines 3-59). The chaotropic substance (lysing reagent) is contacted with silica particles (solid support). The biological material is then treated with purifying reagents, and the remainder of the biological matter is purified (washing buffer, alcohol washing solution and acetone.) Additionally, the process described by Boom produces DNA which can be further used to "demonstrate NA sequences by means of an amplification method such as the PCR method...." (col.4, lines 48-50). Since Boom teaches that the Gus SCN (i.e. the lysis reagent) is added to the solid support (i.e. the silica beads) prior to addition of biological material, Boom is inherently teaching a solid support to which a lysing reagent is "bound." The term "bound" is being broadly interpreted to mean loosely and transiently in contact with the solid support.

Deggerdal teaches methods of characterizing DNA. Deggerdal discloses a "method of isolating nucleic acid from a sample, said method comprising contacting said sample with a

detergent and a solid support, wherby soluble nucleic acid in said sample is bound to the support, and separating said support with bound nucleic acid from the sample" (pg 5, para 2). Deggerdal teaches that the "nucleic acid-containing sample may....be contacted with the detergent and solid phase which may be added to the sample prior to, simultaneously with, or subsequently to the detergent (which functions in the method to lyse)"(pg 7, para 3, lines 22-29). Deggerdal is inherently teaching a solid support to which a lysing reagent is "bound." The term "bound" is being broadly interpreted to mean loosely and transiently in contact with the solid support. The solid support was contained in a vessel (pg 26, line 18). Deggerdal teaches isolation of nucleic acids and the elution of the nucleic acid by heating to 65 C for 5-10 minutes (pg 12, para 3, line 3)(limitations of claims 4 and 44). The samples may be of "any material containing nucleic acid" (pg 6, para 1, line 1-3)(limitations of claims 5-7). Deggerdal teaches a method of DNA isolation from cultured cells which indicates the number of cells used as starting material (pg 33, line 1) (limitations of claims 8-9). The purified DNA was then analyzed by PCR and visualized on agarose gel electrophoresis (pg 20, lines 29-32).

Boom nor Deggerdal specifically teach sequencing the purified DNA.

However, Sambrook teaches the analysis of DNA by nucleic acid sequencing (13.3). Sambrook teaches that the sequences provide the advantage of determining the sequence of nucleotides in a particular DNA molecule.

Therefore, it would have been prima facie obvious to one of ordinary shill at the time of the invention was made to have modified the method of Boom or Deggerdal to include the

sequencing analysis method taught by Sambrook in order to make the claimed invention as a while. The ordinary artisan would be motivated to have sequenced the purified DNA obtained by the Boom method in order to have achieved the expected advantage of determining the sequence of nucleotides of the isolated DNA.

17. Claims 33 and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boom (5,804,684) or Deggerdal (WO 96/18731) in view of Arnold (5,599,667).

Boom teaches methods of characterizing DNA. Boom discloses a process which involved contacting the biological material that contains DNA with a solid support that had been treated with a lysing reagent (i.e. a chaotropic substance), treating the biological material with a purifying reagent, and purifying the DNA (col. 4, lines 3-59). The chaotropic substance (lysing reagent) is contacted with silica particles (solid support). The biological material is then treated with purifying reagents, and the remainder of the biological matter is purified (washing buffer, alcohol washing solution and acetone.) Additionally, the process described by Boom produces DNA which can be further used to "demonstrate NA sequences by means of an amplification method such as the PCR method...." (col.4, lines 48-50). Since Boom teaches that the Gus SCN (i.e. the lysis reagent) is added to the solid support (i.e. the silica beads) prior to addition of biological material, Boom is inherently teaching a solid support to which a lysing reagent is "bound." The term "bound" is being broadly interpreted to mean loosely and transiently in contact with the solid support.

Deggerdal teaches methods of characterizing DNA. Deggerdal discloses a "method of isolating nucleic acid from a sample, said method comprising contacting said sample with a detergent and a solid support, wherby soluble nucleic acid in said sample is bound to the support, and separating said support with bound nucleic acid from the sample" (pg 5, para 2). Deggerdal teaches that the "nucleic acid-containing sample may....be contacted with the detergent and solid phase which may be added to the sample prior to, simultaneously with, or subsequently to the detergent (which functions in the method to lyse)"(pg 7, para 3, lines 22-29). Deggerdal is inherently teaching a solid support to which a lysing reagent is "bound." The term "bound" is being broadly interpreted to mean loosely and transiently in contact with the solid support. The solid support was contained in a vessel (pg 26, line 18). Deggerdal teaches isolation of nucleic acids and the elution of the nucleic acid by heating to 65 C for 5-10 minutes (pg 12, para 3, line 3)(limitations of claims 4 and 44). The samples may be of "any material containing nucleic acid" (pg 6, para 1, line 1-3)(limitations of claims 5-7). Deggerdal teaches a method of DNA isolation from cultured cells which indicates the number of cells used as starting material (pg 33, line 1) (limitations of claims 8-9). The purified DNA was then analyzed by PCR and visualized on agarose gel electrophoresis (pg 20, lines 29-32).

Boom nor Deggerdal specifically teach using polyolefin as a solid support wherein polyolefin is hydrophilic and has a charge.

However, Arnold teaches polycationic solid supports that can be used purification of nucleic acids (see abstract). The polycationic support matrix is taught to include inorganic and organic materials which include glasses, polyolefins and polysaccharides (col.8, lines 55-62).

Therefore, it would have been prima facie obvious to one of ordinary skill at the time of the invention was made to have modified the method of Boom or Deggerdal to include the solid supports of Arnold in order to make the claimed invention as a whole. The ordinary artisan would be motivated to have substituted polyolefins as a solid support in the Boom or Deggerdal method because Arnold taught that polyolefins and glass are both suitable for DNA isolation because they meet the same "principle requirement" of "not unduly adsorbing either contaminants or nucleotide probes (col. 8, lines 61-64). Consequently Arnold shows that the silica of Boom or Deggerdal and the polyolefins of the claims are equivalent.

18. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boom et al (5,234,809) or Deggerdal (WO 96/17831) in view of Arnold (5,599,6667) as applied to claim 33, 35-36 above, and further in view of Hasebe (5,151,345).

Arnold teaches polycationic solid supports that can be used purification of nucleic acids (see abstract). The polycationic support matrix is taught to include inorganic and organic materials which include glasses, polyolefins and polysaccharides (col.8, lines 55-62).

However, neither Boom or Deggerdal nor Arnold specifically teaches that polyolefin is a mixture of low density polyethylene and polypropylene fibers.

However, Hasebe teaches that "a polyolefin resin is preferred, and low-density polyethylene, high-density polyethylene...or a blend thereof is preferably used"(col 11, lines 32-39).

Therefore, it would have been prima facie obvious to one of ordinary skill in the art at the time of the invention was made to combine the methods of Boom or Deggerdal and Arnold as discussed above and use the types of polyolefins taught by Hasebe. As Arnold teaches that "polyolefins" may be used in DNA isolation, one of ordinary skill in the art would have been motivated to use a preferred polyolefin resin.

No Claims are allowable over the prior art.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Jeanine Enewold whose telephone number is (703) 306-5817. The examiner can normally be reached Monday-Thursday from 7:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Jones, can be reached on (703) 308-1152. The fax number for this Group is (703) 308- 4242.

Any inquiry of a general nature should be directed to the Group receptionist whose telephone number is (703) 308-0196.

Jeanine Enewold

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